Guide to the
Lunar Prospector Project Records, 1995-1998
AFS8000.5-LP

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NASA Ames Research Center

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Descriptive Summary

Title:
Lunar Prospector Project Records, 1995-1998

Collection Number:
AFS8000.5-LP

Creator:
Office of the Director of Space Research (Code S)

Dates:
Inclusive: 1989-1999
Bulk: 1995-1998

Extent:
Volume: 6.5 cubic feet

Repository:
NASA Ames History Office
Moffett Field, California 94035

Abstract:
The Lunar Prospector mission management records accumulated by Deputy Mission Manager Sylvia A. Cox document the management of all aspects of the project, from the initial proposal through the extended mission. The collection contains proposals, contracts, correspondence, status reports, planning documents, design reviews, scientific findings, presentations, and news footage.

Administrative Information

Access:
Access to portions of the collection is subject to national export restrictions.
Contact the repository for a complete inventory.

Publication Rights:
Copyright does not apply to United States government records. For non-governmental material, researcher must contact the original creator.

Preferred Citation:
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Administrative History

The Lunar Prospector Discovery Mission to study our moon launched from Kennedy Space Center atop an Athena II rocket on January 7, 1998 UT (January 6 EST). Five days later, it reached the moon and circled it in a polar orbit for the next 19 months. The spacecraft mapped the moon, collecting data about gravity fields, magnetic fields, geochemical composition, and gas-release events. On July 31, 1999 UT the mission team purposely slammed the craft into a permanently shadowed area of a crater near the south pole, in an attempt to find evidence of water ice. Though this dramatic attempt proved unsuccessful, data from the neutron spectrometer experiment showed an abundance of hydrogen. Analysis of these data along with data obtained from the Naval Research Laboratory's Clementine mission strongly suggested that deposits of water ice might be present at both poles of the moon (Feldman, et al. 1998).

Lunar Prospector was a small, spin-stabilized spacecraft, just over four feet in diameter and about four and one half feet tall. It had three booms that extended about eight feet out and carried five instruments and six science experiments: a Gamma Ray Spectrometer, Neutron Spectrometer, Magnetometer, Electron Reflectometer, Alpha Particle Spectrometer, and Doppler Gravity Experiment. Also aboard Lunar Prospector was a small polycarbonate vial containing one ounce of the cremains of the late astronomer Eugene Shoemaker. As an honorary gesture, Shoemaker's ashes were embedded in the lunar surface with the spacecraft, for the first ever space burial of a human being on a celestial body.

In February 1995, Lunar Prospector was selected to be one of NASA's low cost Discovery Program missions designed to help us explore and better understand the solar system. Characterized by its adherence to a "faster, better, cheaper" model envisioned by then NASA Administrator Dan Goldin, the goal of NASA's Discovery Program was "to achieve outstanding results by launching many smaller missions using fewer resources and shorter development times" (National Aeronautics and Space Administration, 2011). To this aim, the Lunar Prospector team adopted the management approach of Lockheed Martin's "Skunk Works," which used streamlined methods and principles to efficiently develop the U-2, SR-71, and F117A. With a rapid completion in 22 months and total cost of $62.8 million, including development, launch vehicle, and operations (National Aeronautics and Space Administration, 2010), the Lunar Prospector mission successfully fulfilled Discovery Program objectives.

The mission was managed from NASA Ames Research Center in Moffett Field, California, by the Space Projects Division (Code SF) within the Office of the Director of Space Research (Code S), with G. Scott Hubbard designated as Mission Manager. During the life of the project, from proposal phase onward, Hubbard managed the mission while serving as Acting Chief of Code SF (1995-1996), Associate Director of Code S (1997), Deputy Director of Code S (1998), and finally Associate Director for Astrobiology and Space Programs for the Office of the Director (Code D, 1999). Sylvia A. Cox served as Lunar Prospector's Assistant then Deputy Mission Manager, working in the Advanced Projects Branch (Code SFS, 1995-1997) and Project Operations Branch (Code SFE, 1998-1999) of the Space Projects Division. The prime contractor for the mission (under contract NAS2-14256) was Lockheed Martin Missiles and Space Company (LMMSC) in neighboring Sunnyvale, California, with Alan B. Binder of the Lunar Research Institute in Tucson, Arizona as Principal Investigator (from 1998-1999, Binder was a LMMSC subcontractor working in Code SF) and Thomas A. Dougherty served as LMMSC Project Manager. LMMSC in Littleton, Colorado provided the Athena II launch vehicle.

Sources Consulted

Feldman, Maurice, Binder, Barraclough, Elphic, and Lawrence, "Fluxes of Fast and Epithermal Neutrons from Lunar Prospector: Evidence for Water Ice at the Lunar Poles." *Science* 4 (September 1998): 1496-1500.

Fletcher, "'Burying' a man on the moon." *Associated Press*, July 31, 1999, retrieved February 17, 2011 from http://www.msnbc.msn.com/id/3077929/ns/technology_and_science-space/

National Aeronautics and Space Administration (2010). *Lunar Prospector*. Retrieved February 16, 2011 from http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1998-001A

National Aeronautics and Space Administration (2011). *Discovery Program Overview*. Retrieved February 16, 2011 from http://discovery.nasa.gov/program.cfml

NASA Ames History Office, NASA Ames Research Center. Moffett Field, California. AFS1070.8A, Archives Reference Collection. Telephone Directories. 1995-1999.

Scope and Content

The Lunar Prospector Project Records (6.5 cubic feet), accumulated by Deputy Mission Manager Sylvia A. Cox, document the management of all aspects of the mission: business activities; science objectives and experiments; public outreach and education; flight and launch system design, integration, and testing; and ground system and operations efforts. Also included are published scientific findings and news clips about the mission. **Series I** is comprised of regular reports that detail the progress of the program and its extension. Plans, costs, scheduling, systems design, operations, and outreach efforts are discussed in these reports. **Series II** contains major engineering systems and operations design reviews, which reflect the systematic development and examination of the spacecraft and its operational support structures throughout the project. **Series III** details the development of the launch architecture, with launch vehicle selection, system design, and operations documentation. **Series IV** contains an assemblage of files related to the initiation, and technical and business oversight of the program. Present are proposals, requirements, contracts, correspondence, mission descriptions, and technical documents. **Series V** consists of a collection of published research findings in scientific journals such as *Science* magazine. **Series VI** contains video footage, most of which is reportage about the mission.

The bulk of the material in this collection is textual, with a few VHS tapes in Series VI and a handful of decals and CD-ROM discs in the "Outreach Materials" file in Series IV.

System of Arrangement

This collection is arranged in six series, with Series I-III arranged chronologically and Series IV-VI arranged alphabetically and by format. In the absence of a usable original order, this arrangement was imposed during processing. Two versions of filenames were present for about fifty percent of the records, one set appearing on the file tabs and another on adhesive notes affixed to the file folders. The latter were used, as they appeared to be the most descriptive and most current. Redundancies in file titles were omitted on a great majority of the files, such as repetition of the words "Lunar Prospector" or "Lunar Prospector Discovery Mission."

Series Descriptions

Series I: Recurring Mission Reports, 1995-1998 (42 folders)

This series is arranged into two subseries consisting of regular mission reports prepared for the Lunar Prospector teams and NASA headquarters on weekly, monthly, and quarterly bases. The records provide an overview of the mission's management, from tracking costs, schedules, and performance metrics to overseeing the development and testing of the spacecraft.

1. Monthly Project Management Reports
The first subseries of thirty-one files contains monthly reports. Dated from May 1995 through January 1998, these are prepared by the Lockheed Martin Missiles and Space Company's Space Systems Division according to requirements in contract NAS2-14256. Compiled by Lunar Prospector Project Manager Thomas A. Dougherty and Principal Investigator Alan B. Binder, the reports summarize project activities and program status. Included are cost, schedule, and technical information: budget tracking tables, performance management metrics, master and subsystem schedules, and status reports.

2. Quarterly Reviews and Monthly Status, Financial, and Weekly Activity Reports
The second subseries of eleven files consists of monthly status reports prepared for NASA headquarters that are dated from 1995 to 1997, quarterly reviews dated from January 1997 through December 1998, and weekly activity reports dated from October 27, 1995 through October 24, 1997. The headquarters monthly status reports and quarterly reviews were prepared by Ames Mission Manager G. Scott Hubbard, Deputy Mission Manager Sylvia Cox, and Operations Manager Marcie Smith, with regular contributions from Principal Investigator Alan Binder and Dynamics Officer Daniel Swanson. These short documents are formatted as presentations with headings and bulleted remarks. Contents include programmatic assessments and reporting on operations, public relations, education, issues and concerns, schedules, financial status, anomalies, science instruments, and the extended mission. Weekly activity reports, compiled by Program Manager Thomas A. Dougherty, detail ongoing project activities and run from one to six pages long. Regular submissions from various team leads such as Irving Bernard, Kimberly Foster, Robert Garner, William Jacobsen, and Woody Woodcock provide insight into spacecraft design, testing, troubleshooting, launch vehicle integration, system engineering, electrical power, avionics, ground system, software, scheduling, and program office activities.

Series II: Design Reviews, 1995-1998 (30 folders)

This series contains engineering systems design and operations review documentation generated throughout the mission, dated from July 1995 through November 1998. Included are 1995 internal and technical design reviews; 1996 status, formal design, and test readiness reviews; and 1997-1998 critical design, pre-ship, flight, spacecraft, launch readiness, and extended mission reviews.

Series III: Launch System, 1989-1998 (35 folders)

This series consists of records specific to launching the Lunar Prospector spacecraft, the bulk of which are dated from 1995 to 1998. Included are launch vehicle status and update records; critical design reviews; launch risk assessment and management documents; launch vehicle and propulsion subsystem descriptions; and launch sequence and countdown instructions.

Series IV: Other Project Files, 1995-1999 (82 folders)

This series consists of two record books and files related to all mission management activities, from the program's inception through spacecraft and mission operations, to end of mission wrap up and review. Contents include proposals for the original and extended missions, subcontractor and partner agreements and contract modifications, requirements documents, management plans, program plans, guidelines, correspondence, meeting agendas, presentations, status reports, communication system test procedures and results, timelines, organization charts, rosters, team lists, awards lists, and outreach materials. Also present are records related to spacecraft tracking, environmental assessment, operations planning, data management and data archiving.

Of interest is a record book by Robert W. Jackson, the Spacecraft Operations Branch Chief for NASA Ames during the mission. Dated from 1995-1999, with most entries in 1995, the book contains handwritten notes with related documents pasted on or tucked between pages, primarily concerning technical oversight of ground operations, such as communications, tracking, and data archiving. Included are correspondence, organization charts, meeting agendas, memoranda, and scattered portions of project, planning, proposal, and budget documents.

Series V: Science Results (14 folders)

This series consists of scientific findings, in the form of article copies and reprints, from data collected during the Lunar Prospector mission. Subjects discussed include the overall mission, neutron measurements supplying evidence for water ice at the poles, lunar surface magnetic fields, lunar gravity fields, and lunar elemental maps.

Series VI: Audio Visual Material, 1995-1999 (10 VHS tapes)

This series consists of video recordings. Most tapes contain news footage about the mission award selection, flight, and results, in the form of NASA press conferences and news clips from cable and television channels. One tape has 42-minutes of unedited footage of a boom arm deployment test.

Indexing Terms

The following terms may be used to index this collection.

Corporate Name
Ames Research Center

Subjects
Lunar Prospector (Spacecraft)
Lunar Exploration
Moon--Exploration--20th century.

Separated Material

None.

Related Collections

AFS1070.8A: Archives Reference Collection
PP10.16: David W. Lozier Papers
PP03.02: Robert W. Jackson Collection, 1964-1999

Container List

Contact the archivist for a complete inventory.